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Canadian Science Advisory Secretariat
Science Response 2015/023

Newfoundland and Labrador Region

ATLANTIC SALMON (*Salmo salar*) STOCK STATUS UPDATE IN NEWFOUNDLAND AND LABRADOR FOR 2014

Context

The stock assessment of Atlantic Salmon (*Salmon salar*) in the Newfoundland and Labrador (NL) Region is conducted every five years, with the most recent assessment completed in 2013 (DFO 2014). An annual update of the stock status is prepared in interim years to provide information to Fisheries Management and the general public. Indicators of adult and juvenile (smolt) Atlantic Salmon stocks are derived from data collected at monitoring facilities and fisheries catch statistics, which are summarized in this report. Three of the four (75%) monitored rivers in Labrador and five of the 10 (50%) in Newfoundland did not achieve conservation egg requirements (CER) in 2014.

This Science Response Report results from the Science Response Process of April 21, 2015, on the Newfoundland and Labrador Atlantic Salmon (*Salmo salar*) 2014 Stock Status Update.

Background

In 2014, NL Atlantic Salmon populations were monitored on 14 rivers (Figure 1). For management purposes, Atlantic Salmon are categorized as small salmon (less than 63 cm fork length) and large salmon (equal to or greater than 63 cm fork length). The status of Atlantic Salmon river populations is assessed by comparing estimated egg deposition (calculated from salmon counts, angling data and biological characteristics) to the river-specific CER that is considered a limit reference point in the context of Fisheries and Oceans Canada's (DFO) Precautionary Approach Framework (O'Connell *et al.* 1997; Reddin *et al.* 2006; DFO 2009; Chaput *et al.* 2012). Annual comparisons are generally made to a long-term mean (moratorium years of the commercial salmon fishery) as well as the previous five-year mean for Newfoundland and six-year mean for Labrador, which correspond to the average Atlantic Salmon generation times.

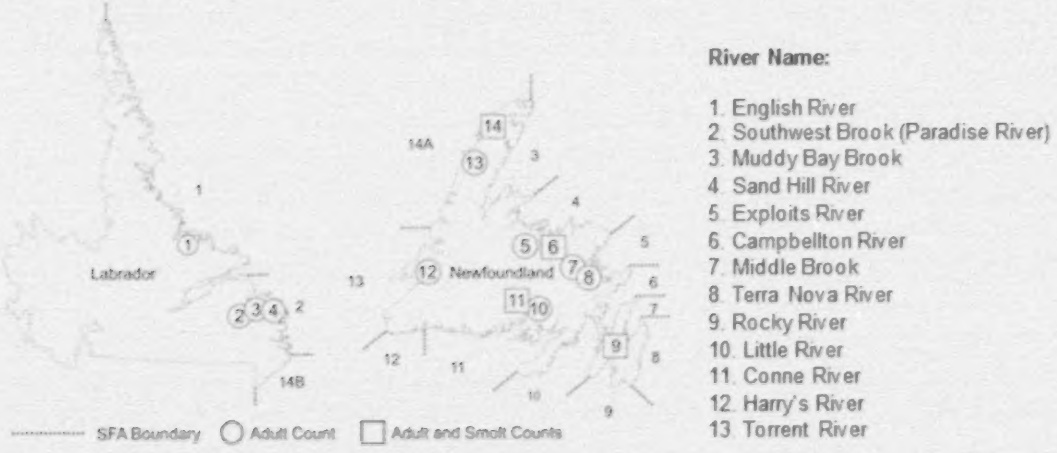

Figure 1. Map showing the locations of rivers in Salmon Fishing Areas (SFAs) 1-14B where Atlantic Salmon populations were monitored in 2014.

Analysis and Response

Abundance of Adult Salmon

Adult salmon returning to rivers in NL are predominantly small salmon (range 76-98%) that are mainly virgin one-sea winter fish (1SW, grilse) (2009-13; Table 1). Large salmon in Newfoundland are mainly repeat spawners with the exception of SFA 13 (Harry's River, southwest coast) which has a larger multi-sea winter component (MSW). Large salmon in Labrador are mainly MSW salmon (Table 1).

Table 1. Characteristics of small and large Atlantic Salmon sampled in NL 2009-13.

Area	Small Sample Size	% Small Virgin 1SW	% Small Virgin MSW	% Small Repeat 1SW	% Small Repeat MSW	Large Sample Size	% Large Virgin 1SW	% Large Virgin MSW	% Large Repeat 1SW	% Large Repeat MSW
Labrador	1566	99.1	0.2	0.7	-	356	5.6	71.9	17.7	4.8
Newfoundland (excluding SFA 13)	3166	93.9	0.1	6.0	-	327	5.9	7.3	86.2	0.6
SFA 13	200	77.0	0.0	22.5	0.5	129	-	31.8	48.1	20.1

Returns of adult salmon to monitored rivers in NL are displayed in Figures 2 to 5. In 2014, returns of small salmon were generally similar to or greater than the long-term moratorium means with the exception of southern Labrador (SFA 2) and two south coast Newfoundland rivers (SFA 11). Returns of large salmon were more variable with substantive declines relative to the long-term moratorium mean occurring at three south coast Newfoundland rivers (Figure 4). Small and large salmon returning to English River in northern Labrador (SFA 1) (Figure 2) in 2014 were the highest on record, whereas returns to Conne River and Little River (SFA 11) (Figure 6) were the second lowest on record. Salmon returns to Conne River have declined by more than 70% over the period 1986 to 2014. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC designated South Newfoundland (SFAs 9-12) Atlantic Salmon populations as *threatened* in 2010 (COSEWIC 2010).

Conservation Egg Requirements (CER) Reference Point

Preliminary summaries of the 2014 status of salmon populations in Newfoundland are provided in Table 2 and for Labrador in Table 3. Three of the four (75%) monitored rivers in Labrador did not achieve CER and were in southern Labrador (SFA 2). English River in northern Labrador (SFA 1) achieved CER and was above the previous six-year mean. In Newfoundland, five (50%) of the 10 assessed rivers did not achieve CER and four were below the previous five-year mean. Three of the rivers that did not achieve CER are located on the south coast of Newfoundland (Rocky River, Conne River and Little River), while the other two are located on the northeast coast (Exploits and Terra Nova). Four of these rivers have undergone enhancement and have yet to achieve CER (Rocky River, Little River, Exploits River and Terra Nova River).

Table 2. Preliminary summary of the 2014 status of Atlantic Salmon populations in Labrador (SFAs 1, 2 and 14B).

River	SFA	2014 Small Salmon Return	2014 Large Salmon Return	2008-13 Mean Small Salmon Return	2008-13 Mean Large Salmon Return	2014 Conservation Egg Requirement Achieved (%)	2008-13 Mean Conservation Egg Requirement Achieved (%)	Number of years Conservation Egg Requirement Achieved 2008-14
English River	1	839	190	387	101	276	135	6
Sand Hill River	2	1834	587	3747	803	59	104	2
Muddy Bay Brook	2	152	22	320	22	66	123	3
Southwest Brook	2	182	38	237	32	72	84	2

Footnote: Muddy Bay Brook was not operational in 2010 and 2012.

Table 3. Preliminary summary of the 2014 status of Atlantic Salmon populations in Newfoundland (SFAs 3-14A).

River	SFA	2014 Small Salmon Return	2014 Large Salmon Return	2009-13 Mean Small Salmon Return	2009-13 Mean Large Salmon Return	2014 Conservation Egg Requirement Achieved (%)	2009-13 Mean Conservation Egg Requirement Achieved (%)	Number of years Conservation Egg Requirement Achieved 2008-2014
Exploits River	4	26817	2895	31992	6173	52	63	0
Campbellton River	4	4055	478	4096	509	421	412	6
Middle Brook	5	2917	424	2561	253	364	278	6
Terra Nova	5	3400	534	3837	407	62	63	0
Rocky River	9	367	41	570	33	42	60	0
Little River	11	48	4	206	4	22	91	2
Conne River	11	1234	56	1962	79	49	76	1
Harry's River*	13	3755*	3755*	3084*	3084*	110	91	3
Torrent River	14A	4166	561	3114	1302	744	832	6
Western Arm Brook	14A	1426	35	1215	62	467	444	6

**Harry's River is returns of small and large salmon combined.*

Smolt Abundance and Marine Survival

Smolt abundance (freshwater production) in 2014 was similar to or greater than the previous five-year mean (Figure 6). Marine survival of 2013 smolt to returning small salmon in 2014 was similar to or greater than the previous five-year mean with the exception of Conne River which was the lowest on record (Figure 7). Overall, marine survival continues to remain at relatively low levels despite the closure of marine commercial fisheries in Newfoundland (1992) and Labrador (1997/1998).

Newfoundland and Labrador Salmon Harvest

The 2014 estimate of total harvest in the recreational fishery was 19,743 salmon. The number of hooked and released fish was estimated at 22,720 for a total catch of 42,463 salmon (Figure 8). Recreational catches have been variable since 2005, with an overall decline over the past five years.

Labrador subsistence fisheries harvested 12,968 salmon (4,003 small and 12,968 large) (33 t) in 2014, which is similar to the previous six-year mean (Figure 9). In general, subsistence fishery harvests increased from 1999 to 2004 and since then have remained relatively stable averaging approximately 34 t per year. Genetic analysis indicates that the Labrador subsistence fisheries exploit predominantly Labrador origin salmon (> 95%).

Sources of Uncertainty

No current assessments are available on salmon populations in SFAs 3, 6, 7, 10, 12 and 14B and the Lake Melville area of SFA 1.

Salmon populations in assessed rivers may be unique and not representative of other rivers in the SFA.

Historical or estimated biological characteristic data (e.g. fecundity, sex ratio, female size) and extrapolated catch data used in the assessment process adds uncertainty in the conservation egg requirement values.

Conclusions

Three of the four (75%) monitored rivers in Labrador did not achieve CER in 2014. In Newfoundland, five of the 10 (50%) monitored rivers did not achieve CER and three of these were on the south coast. Salmon returns to NL rivers have increased since the commercial salmon fisheries moratorium, with the exception of some rivers on Newfoundland's south coast. In general, annual returns of salmon are highly variable and populations on the south coast continue to decline. Marine smolt survival is considered to be a major factor limiting the abundance of Atlantic Salmon within the region.

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April 27, 2015

Sources of Information

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Appendix

Labrador (SFAs 1, 2 and 14B)

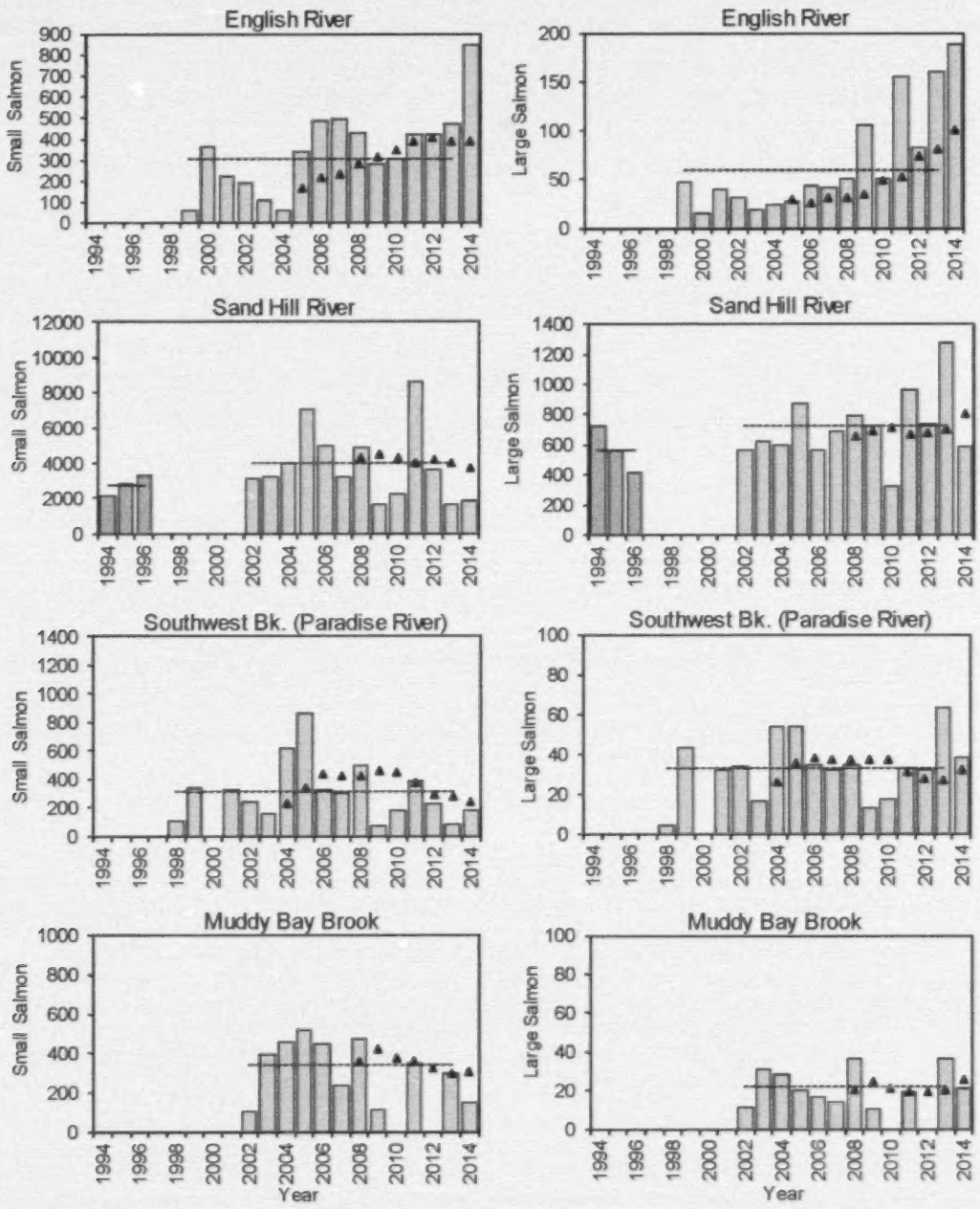

Figure 2. Total returns (bars) of small (top panel) and large (bottom panel) Atlantic Salmon to English River (SFA 1) and three rivers in southern Labrador (SFA 2). Lines represent pre-moratorium 1994-1997 (solid) and moratorium 1998-2014 (dashed) means. Triangles represent previous six-year mean. Salmon monitoring was not completed in all years.

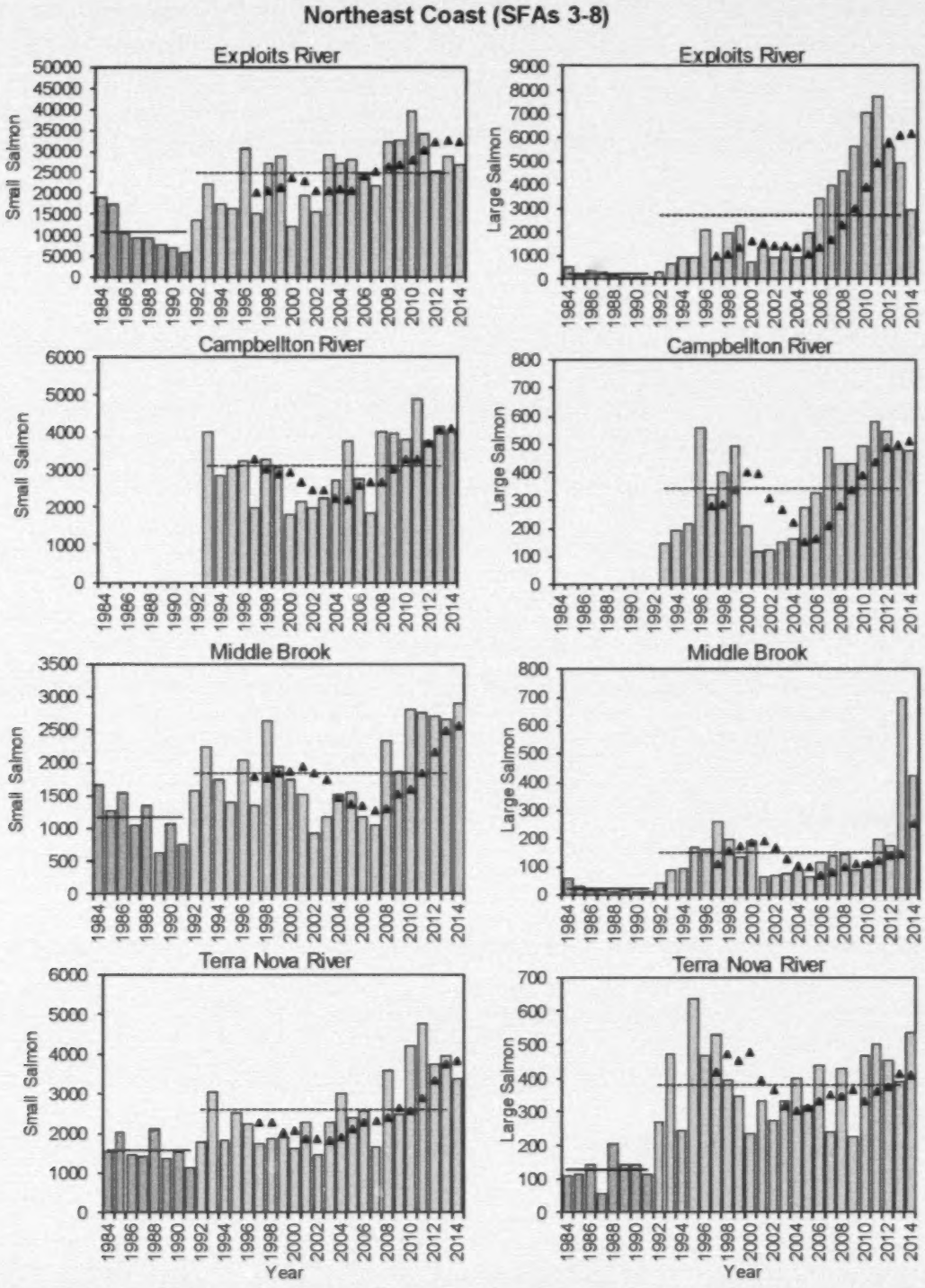

Figure 3. Total returns (bars) of small (left panels) and large (right panels) Atlantic Salmon to four northeast coast rivers (SFAs 3-8). Lines represent pre-moratorium 1984-1991 (solid) and moratorium 1992-2014 (dashed) means. Triangles represent previous five-year mean. Salmon monitoring was not completed in all years.

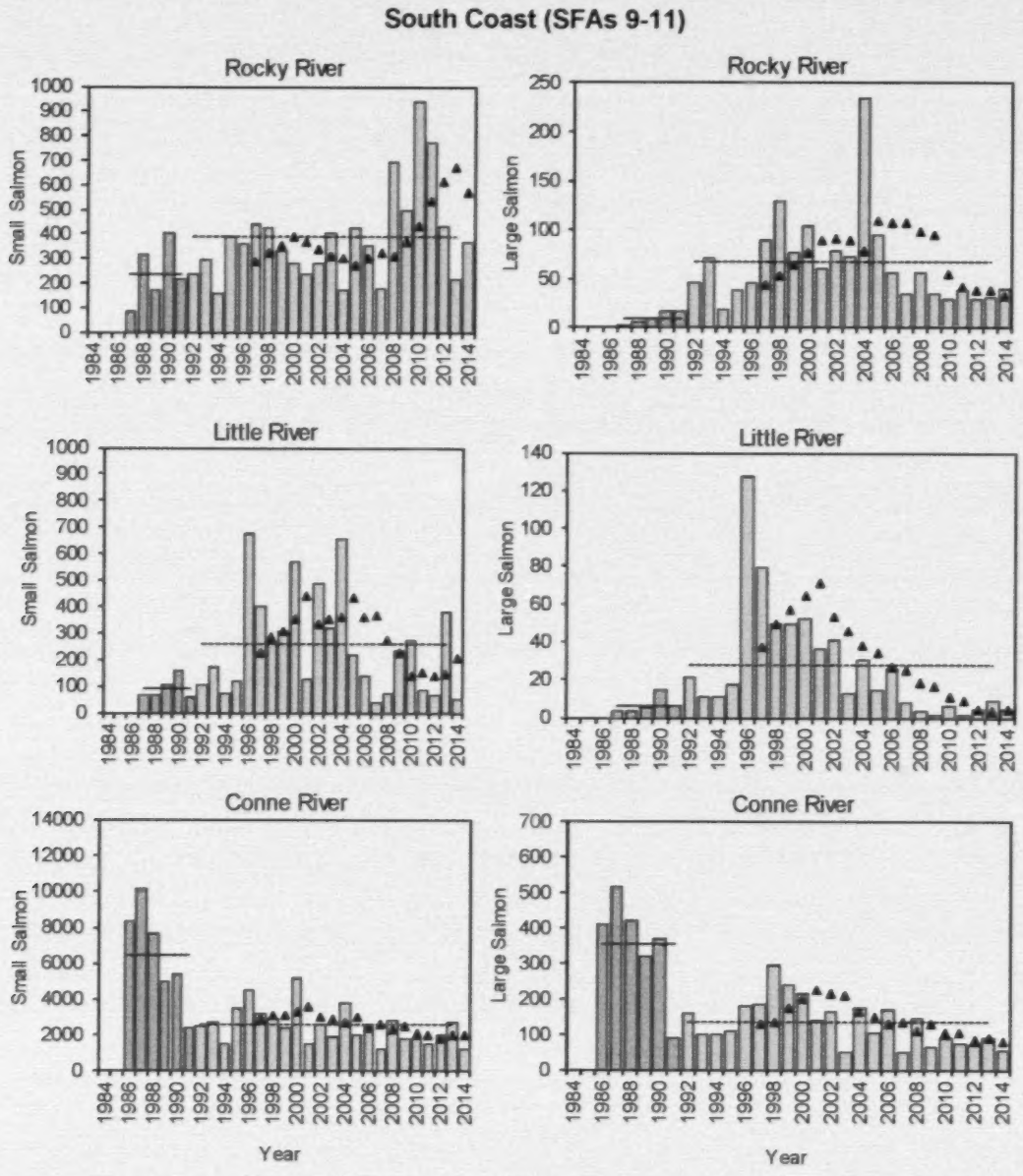

Figure 4. Total returns (bars) of small (left panels) and large (right panels) Atlantic Salmon to three south coast rivers (SFAs 9-11). Lines represent pre-moratorium 1984-1991 (solid) and moratorium 1992-2014 (dashed) means. Triangles represent previous five-year mean. Salmon monitoring was not completed in all years.

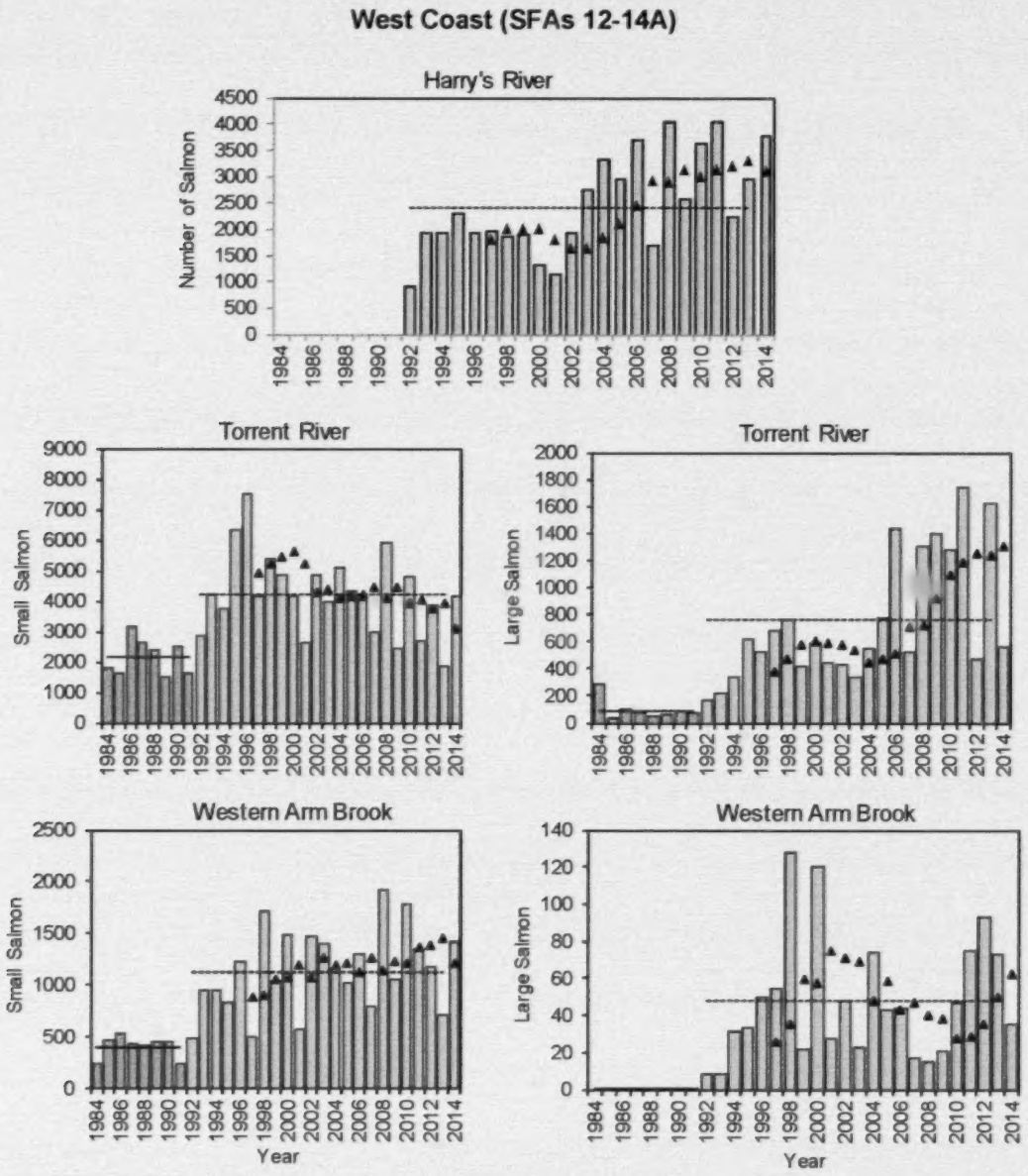

Figure 5. Total returns (bars) of small (left panels) and large (right panels) Atlantic Salmon to three west coast rivers (SFAs 12-14A). Lines represent pre-moratorium 1984-1991 (solid) and moratorium 1992-2014 (dashed) means. Triangles represent previous five-year mean. Salmon monitored at Harry's River are not separated into small and large salmon. Salmon monitoring was not completed in all years.

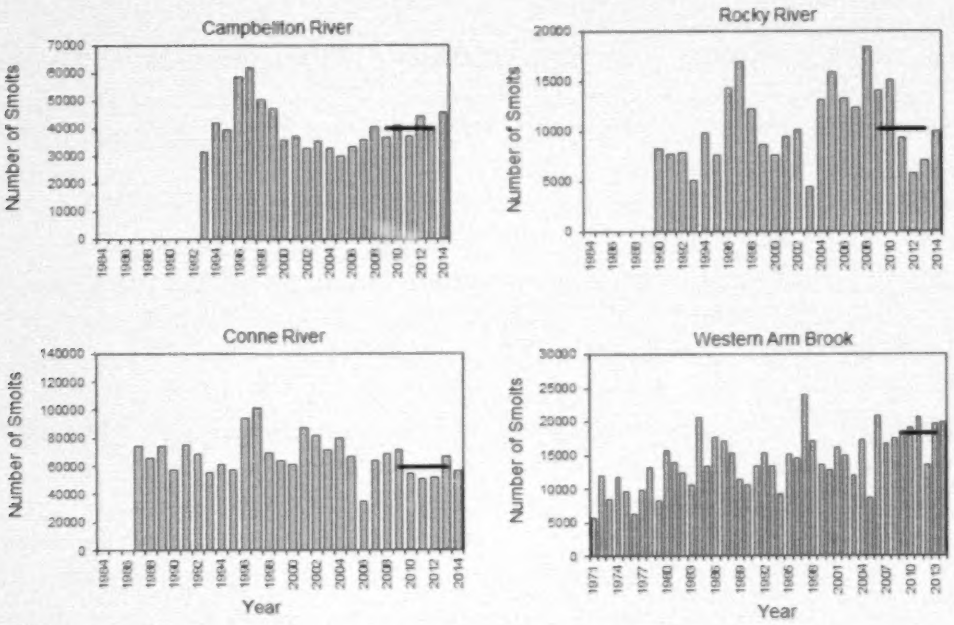

Figure 6. Atlantic Salmon smolt production (bars) of four rivers in Newfoundland. Horizontal black line represents previous five-year mean.

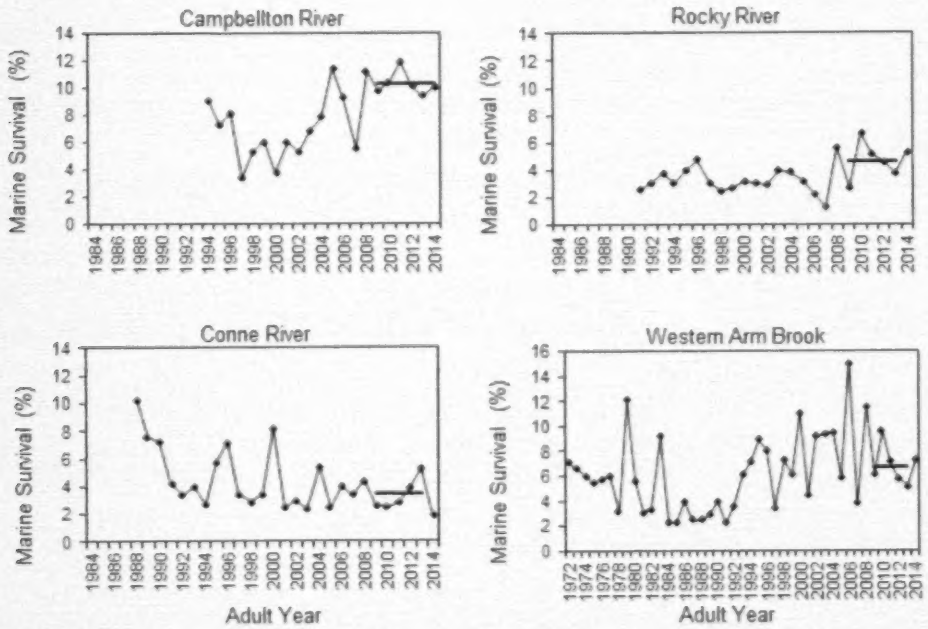

Figure 7. Marine survival of Atlantic Salmon smolt (bars) to small adult salmon from four rivers in Newfoundland. Horizontal black line represents previous five-year mean.

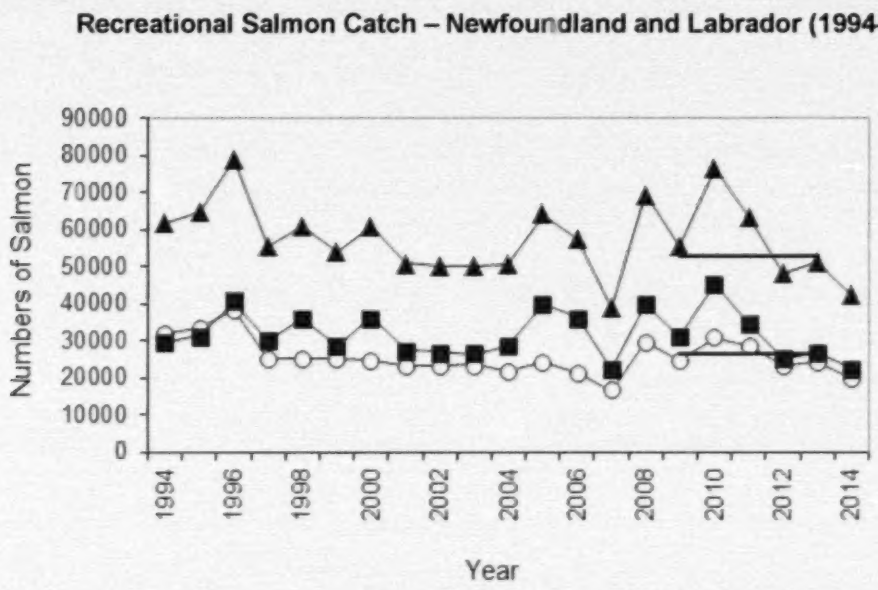

Figure 8. Recreational catch of Atlantic Salmon in Newfoundland and Labrador (1994-2014) for retained fish (open circles), released fish (black square) and total catch (retained + released) (black triangle). Horizontal black line represents previous five-year mean.

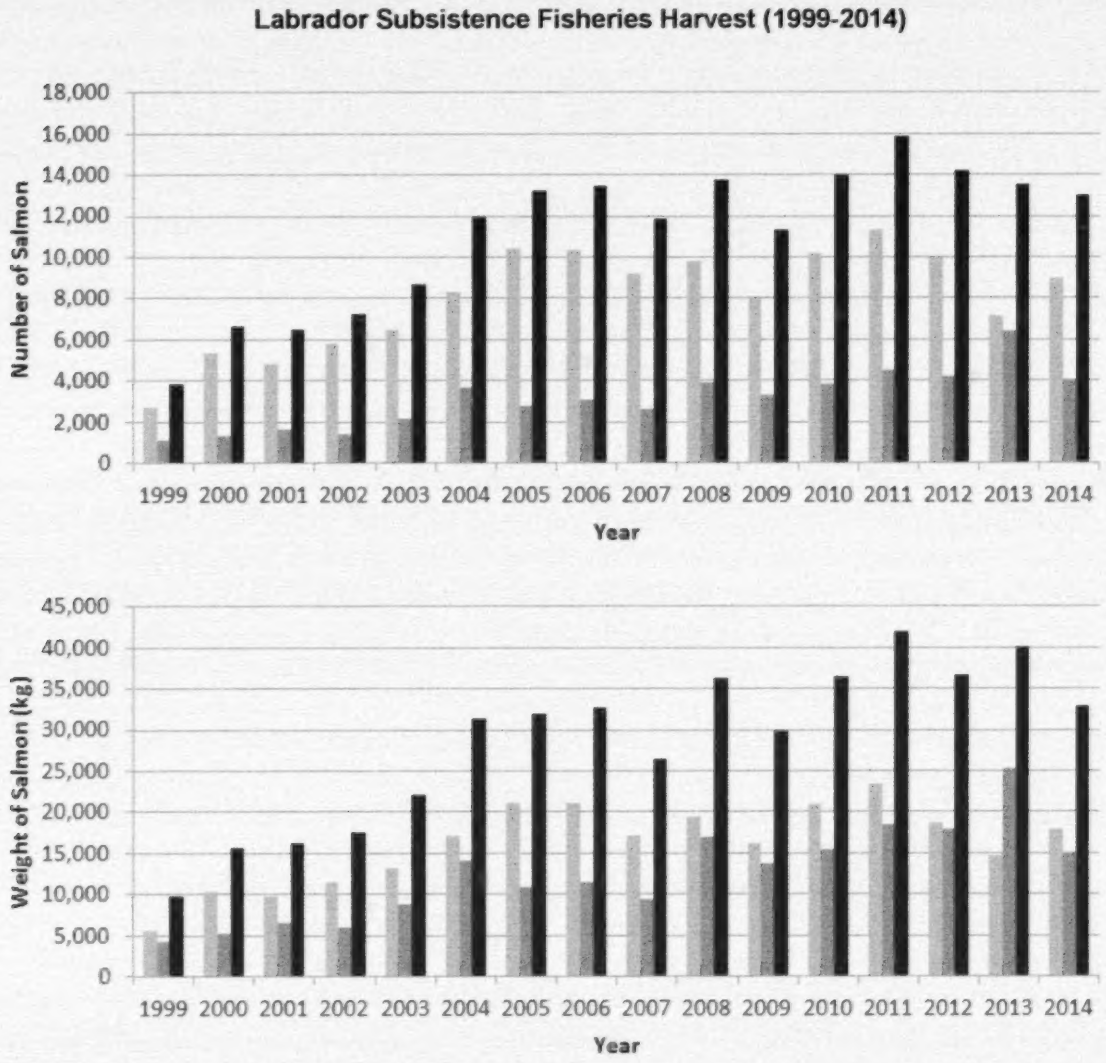

Figure 9. Harvest of small (light grey bars), large (dark grey bars) and total (black bars) Atlantic Salmon from Labrador subsistence fisheries (Aboriginal and Resident) 1999-2014 by number of salmon (upper panel) and weight of salmon (lower panel).

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ISSN 1919-3769
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Correct Citation for this Publication:

DFO. 2015. Atlantic Salmon (*Salmo Salar*) Stock Status Update in Newfoundland and Labrador for 2014. DFO Can. Sci. Advis. Sec. Sci. Resp. 2015/023.

Aussi disponible en français :

MPO. 2015. Mise à jour de l'état des stocks de saumon de l'Atlantique (Salmo salar) à Terre-Neuve-et-Labrador pour 2014. Secr. can. de consult. sci. du MPO, Rép. des Sci. 2015/023.